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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/787,502	03/16/2001	Kazuyuki Tadatomo	210013	3944

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EXAMINER

ORTIZ, EDGARDO

ART UNIT	PAPER NUMBER
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2815

DATE MAILED: 08/13/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.
09/787,502

Applicant(s)
Tadatomo Et.al.

Examiner
Edgardo Ortiz

Art Unit
2815



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Jun 10, 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-7 is/are pending in the application.
- 4a) Of the above, claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
*See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____ 6) ☐ Other: _____

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DETAILED ACTION

This Office Action is in response to a request for continued prosecution and preliminary amendment filed June 10, 2003 on which Applicant amended claim 2.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2-7 are rejected under 35 U.S.C. § 103 (a) as being unpatentable over Khan et.al. (U.S. Patent No. 4,614,961) in view of Pankove (U.S. Patent No. 4,028,720). With regard to Claim 2, Khan teaches a semiconductor light receiving element comprising a light receiving layer comprising a GaN group (column 2, lines 64-66) semiconductor (14), wherein the light receiving layer is a first conductivity type layer (n-type), an electrode (15) formed on one surface of the light receiving layer as a light receiving surface in such a manner that the light can enter the light receiving layer, a depletion layer (column 3, lines 27-31) that can be modified to cover a specific area (column 2, lines 26-47) and that covers an area around the electrode, wherein the light receiving element is a Schottky barrier type light receiving element (column 2, lines 28-35) and the electrode formed on the light receiving surface comprises a Schottky electrode (column 3, lines 7-8).

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However, Khan fails to teach that light enters the depletion layer from the side the electrode is formed and that the total of boundary lines between areas of the light receiving surface covered with the Schottky electrode and exposed areas, is longer than the length of the outer periphery of the light receiving surface. Pankove discloses a photovoltaic device including a body (12) having an incident surface (14) and a grid electrode (24) on a portion of the incident surface, wherein light (30) enters the incident surface from the side the grid electrode is formed and the total of boundary lines between areas of the light receiving surface covered with the Schottky electrode and exposed areas, is longer than the length of the outer periphery of the light receiving surface, as can be seen on figure 1. Therefore, it would have been an obvious modification to someone with ordinary skill in the art, at the time of the invention, to modify the structure as taught by Khan to allow light to enter the depletion layer from the side the electrode is formed and provide total of boundary lines between areas of the light receiving surface covered with the Schottky electrode and exposed areas, is longer than the length of the outer periphery of the light receiving surface, as suggested by Pankove, in order to reduce internal resistance, improve electric current flow and optimize the area needed to receive light while minimizing the outer periphery.

With regard to Claim 3, a further difference the claimed invention and Khan is, the Schottky electrode having a wiring pattern formed by strip conductors in combination. Pankove discloses a photovoltaic device including a body (12) having an incident surface (14) and a grid electrode (24) on a portion of the incident surface, the grid electrode having a wiring pattern comprising

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strip conductors. Therefore, it would have been an obvious modification to someone with ordinary skill in the art, at the time of the invention, to modify the structure as taught by Khan to include Schottky electrode having a wiring pattern formed by strip conductors in combination, as suggested by Pankove, in order to permit light to enter the light receiving layer more efficiently and reduce internal resistance.

With regard to Claim 4, a further difference the claimed invention and Khan is, the thickness of the strip conductors. It would have been an obvious modification to someone with ordinary skill in the art, at the time of the invention, to modify the structure as taught by Khan to include strip conductors with the claimed thickness, so that the thickness allows for strip conductors which permit light to enter the light receiving layer more efficiently and reduce internal resistance.

With regard to Claim 5, a further difference the claimed invention and Khan is, a wiring pattern having a comblike pattern. Pankove discloses a photovoltaic device including a body (12) having an incident surface (14) and a grid electrode (24) on a portion of the incident surface, the grid electrode having a wiring pattern comprising strip conductors in a comblike arrangement. Therefore, it would have been an obvious modification to someone with ordinary skill in the art, at the time of the invention, to modify the structure as taught by Khan to include a wiring pattern having a comblike pattern, as suggested by Pankove, in order to permit light to enter the light receiving layer more efficiently and reduce internal resistance.

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With regard to Claim 6, Khan teaches a light receiving layer (14) that is an uppermost layer of a laminate comprising one or more layer comprising a first conductivity type GaN group semiconductor formed on a crystal substrate (11) and an ohmic electrode (16) formed on the light receiving layer. However, Khan fails to teach an ohmic electrode formed on a layer other than the light receiving layer. Pankove discloses a photovoltaic device including a body (12) having an incident surface (14), a grid electrode (24) on a portion of the incident surface and an electrode (26) formed on a surface opposite to the incident surface and which makes ohmic contact (column 2, line 47). Therefore, it would have been an obvious modification to someone with ordinary skill in the art, at the time of the invention, to modify the structure as taught by Khan to include an ohmic electrode formed on a layer other than the light receiving layer, as suggested by Pankove, in order to provide an ohmic electrode which facilitates tunnel current flow.

With regard to Claim 7, Khan teaches a crystal substrate (11) that is made from a conductive material and an ohmic electrode (16). However, Khan fails to teach the ohmic electrode formed on the crystal substrate. Pankove discloses a photovoltaic device including a body (12) having an incident surface (14), a grid electrode (24) on a portion of the incident surface and an electrode (26) formed on a surface opposite to the incident surface and which makes ohmic contact (column 2, line 47). Therefore, it would have been an obvious modification to someone with ordinary skill in the art, at the time of the invention, to modify the structure as taught by Khan to

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include an ohmic electrode formed on the crystal substrate, as suggested by Pankove, in order to provide an ohmic electrode which facilitates tunnel current flow.

Response to Arguments

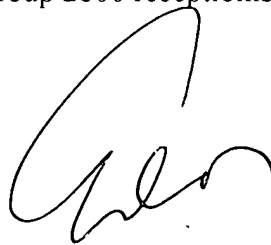
2. Applicant's arguments with respect to claims 2-7 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Edgardo Ortiz (Art Unit 2815), whose telephone number is (703) 308-6183 or by fax at (703) 308-7722. In case the Examiner can not be reached, you might call Supervisor Eddie Lee at (703) 308-1690. Any inquiry of a general nature or relating to the status of this application should be directed to the Group 2800 receptionist whose telephone number is (703) 308-0956.

EO/AU 2815

8/5/03



EDDIE LEE
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